

Paleogeographical reorganization of the Moscow Syncline during the Severodvinian (Capitanian-Wuchiapingian) time based on isotopic ($\delta^{13}\text{C}$ and $\delta^{18}\text{O}$) and paleontological data, Permian Period, East European Platform

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Abstract

© 2015, Pleiades Publishing, Ltd. Detailed studies of the isotope composition of carbon and oxygen ($\delta^{13}\text{C}$ and $\delta^{18}\text{O}$) in sedimentary and pedogenic carbonates from the stratotype of the Severodvinian Stage of the Permian System (Sukhona River, Vologda Region) are provided. In these deposits, the value of $\delta^{13}\text{C}$ is the greatest for the Upper Permian and Lower Triassic of European Russia. This level is correlated with the Kamura isotopic geochemical event in the marine sections of Panthalassa and the Tethyan Region, which was connected with a fall in temperature during the Early–Middle Capitanian. Variations of $\delta^{18}\text{O}$ in the Severodvinian Stage also support the concept of general fall in temperature. The lower part of the Severodvinian Stage is characterized by carbonates with a very heavy oxygen isotope composition, about 32–34‰ SMOW, which accumulated during evaporitization of a large basin. In the upper part of the Severodvinian Stage, the value of $\delta^{18}\text{O}$ rhythmically changes from 22–24‰ SMOW to 34‰, naturally following the cyclicity established based on sedimentological features. The minimal values of $\delta^{18}\text{O}$ are episodes of a significant decrease in salinity as a result of decreased temperature and humidification. The highest values of the isotope content of oxygen correspond to the episodes of short warming and evaporitization of shallow lakes. A general decrease in average annual temperature in the middle of the Severodvinian Age was associated with activation of rivers and intensification of terrigenous sedimentation, which resulted in replacement of the basin facies by alluvial facies and to wide occurrence of aerial and subaerial conditions. Simultaneously, in the latter half of the Severodvinian Age on the East European Platform, there was essential renewal of assemblages of tetrapods, fishes, ostracodes, mollusks, and plants.

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Keywords

isotope geochemistry, Moscow Syncline, paleogeography, Severodvinian Stage, Upper Permian, Vologda Region